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Guest Editorial

FRED B. FALLIS, M.D.

Dr. Fallis was born in Vancouver, and attended the University of Toronto where he received his B.A. degree in Law in 1942. After service in the Air Force until 1945, and then in the Department of External Affairs of the federal government, he returned to the University of Toronto in 1947. He enrolled in Medicine and graduated in 1953. Dr. Fallis joined the staff of the Toronto General Hospital in 1954 and has participated actively in the Family Practice and University Out-Patients Clinics. Since 1970 he has been Professor and Chairman of the Department of Family and Community Medicine at the University of Toronto, and Family Physician-in-Chief at the Toronto General Hospital. Dr. Fallis has also published several papers on family practice and health care delivery, and has served as a member and advisor to numerous planning committees at both the local and national level. This year Dr. Fallis was installed as President of the College of Family Physicians of Canada.

THE GAP IS WHERE THE ACTION IS

This arresting phrase of Marshall McLuhan's at once pictures for us the gap between the primary medical consultation in the doctor's office on the one hand, and on the other, the highly sophisticated complexities of tertiary care institutions and sub-specialty research. "*Action*" suggests the contemporary excitement and challenge of the sparks across the gap.

Modern medicine is more dynamic and effective than ever before. Biomedical expertise continually brings forth new knowledge to bear on the problems of disease and disability. Across the gap stand the Canadian people waiting, ever more community-minded and personally discerning, with a new interest in their own rights and responsibilities for health. New communications and information systems stand ready with a host of new techniques and media. But budget is short, and the cry is for effectiveness and efficiency. No frills and no fat. How then will our generation deploy its "medicine men" so that new research is constantly available to community patients? We require new teams, new methods, new skills.

To answer these challenges and bridge this gap, a new breed of family physician is emerging with specific training for his role. It is thus very gratifying to see this issue of your excellent periodical, *The University of Toronto Medical Journal*, devoted to family practice.

Much of the ground work has already been laid for the specific training of family physicians. Appropriate university departments now exists across Canada with large family practice residency training programs flourishing. New developments in research and continuing medical education have begun.

Much remains to be done in achieving a level of organizational sophistication for family medicine, so that it may compete co-operatively with major health institutions, such as hospitals and public health units, for a fair share of budget to defray the expense of modern facilities and activities. So far we have made more progress with recruiting and curriculum than with community organization and adequate funding for overhead.

The future resolution of these issues belongs to those of you now in medical school. Yours will be the excitement of confirming a new and complete professionalism for family practice in the community: you will seed its research and guide its practice to the point where certification in family medicine will match the Royal College certificate as a bench mark of specific competence for a particular type of patient care. With your sense of community concern and understanding of team work, you have appreciated the value and variety of comprehensive personal patient care much more fully than the preceeding generation. You are choosing to train for family practice in the community in greater numbers than most people thought possible a decade ago. For those of you not about to enter family practice, I would encourage you to keep abreast of the new trends and strength in this field in order to serve as more effective consultants and colleagues. For those of you who will enter family practice in the community, I appeal to you not to sell yourselves short by accepting too brief a period of training. To equip yourselves adequately for this demanding new professional focus in the community takes time, just as does the proper preparation to practice in any other branch of medicine today.

The Family Practice Residency Program

*R. L. Perkin, M.D.**

INTRODUCTION

It is eight years since I last addressed this subject in the University of Toronto Medical Journal.[1] At that time we spoke of the emerging "new specialty" of Family Medicine, and identified the need for a post-graduate program to train medical school graduates proceeding to careers in Family Practice. Much has happened since 1967, and I appreciate the opportunity to report on this subject again. Before dealing with the present situation, I would like to review briefly the significant past events so that you may have a better perspective of this rapidly changing scene.

BACKGROUND

In the decade 1955-1965 there was a 94.6% increase in the number of specialists and only a 4.1% increase in the number of general practitioners at a time when the Canadian population increased 18%.[2] In a study by Alvey[3] of United States graduates of the year 1960, 41% of the students planned to do general practice on entering medical school but at graduation only 24% still planned careers in general practice. The majority cited a lack of contact with general practitioners during undergraduate medical school and a lack of knowledge about general practice as the factors which changed their career choice.

We were on a course that would eventually have led to the extinction of the general practitioner and his replacement by a totally multi-disciplinary health care system. A cartoon that appeared about that time said it all:

> Patient: "Doctor, I hope you treat what I have"
> Doctor: "I hope you have what I treat."

The medical profession became concerned at the trend of events. Most doctors felt it was important to maintain a balance between primary contact general physicians and consultant specialists. There was a strong feeling that we had a good health care system in Canada and that we should try to preserve it. The College of General Practice, which had been founded by the Canadian Medical Association in 1954 to provide an educational focus for G.P.'s, and the Association of Canadian Medical Colleges, representing all the University Faculties of Medicine in Canada, jointly convened two conferences on Education for General Practice in 1962 and 1963.[4, 5]

This was the beginning of Family Medicine – a new discipline with defined objectives and content. The College of General Practice changed its name to The College of Family Physicians of Canada. Family physicians were appointed to Faculties of Medicine as teachers. Divisions and Departments of Family Medicine were established in medical schools across Canada. Undergraduate teaching began. In 1966, three Residency Programs in Family Medicine were started in Calgary, London and Hamilton.

At the University of Toronto, the first major staff appointments were made in 1966, and Family Practice Units were started that same year at several of the teaching hospitals. In 1969, the Department of Family and Community Medicine was established by Faculty Council. The Family Practice Residency Program began the following year in July 1970 with 30 first year residents.

GENERAL CONSIDERATIONS

There were a number of major decisions made by the group of Faculty members, both family physicians and consultant colleagues, who met over the two years from 1967 to 1969 to design the University of Toronto Family Practice Residency Program.

1. It was decided that it should be a two year program with an optional third year for those residents who required additional training. We considered two years an adequate period of time in view of the increased clinical experience provided to students in their final undergraduate year by the clinical clerkship. The residency programs already in existence were all of three years' duration, but we were able to convince The College of Family Physicians of Canada that our two year concept was valid.

2. The Program should place strong emphasis on training in ambulatory care and continuing care of patients and families. This type of training was totally lacking in the rotating internship and in previous postgraduate programs for general practice. This had always been the major problem – doctors were being trained in one setting (the teaching hospital) to practise in a very different setting (the doctor's office, the patient's home, the community, and the community hospital). It was analogous to teaching someone to ride a bicycle and expecting him to perform brilliantly on a horse!

3. The University of Toronto Residency Program should be rotation-based. Our Medical School is large and it is located in the heart of a big city. We felt that family practice residents should be in the mainstream of clinical activity, rubbing shoulders with their counterparts in other training programs, exposed to and challenged by the wealth of patient problems afforded by a large city like Toronto. We also wished to utilize the teaching strength of the older established departments in the Faculty to assist in the training of our residents. We felt that it would be wrong for family practice residents to be isolated from the postgraduate students in other programs.

4. Our program needed to be flexible. Family practice is very different in Wawa or even in Barrie than it is in downtown Toronto. We therefore developed the concept of resident streaming:

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* Professor and Co-ordinator, Residency Training Program, Department of Family & Community Medicine, University of Toronto.

Stream A – urban practice
Stream B – suburban or small town practice
Stream C – rural or remote area practice

As the Residency Program has matured, we have developed more elective time in the second year so that residents with varying career goals will have the time for learning opportunities designed to meet their needs. Most of the residents who take the optional third year in our Program are Stream C trainees taking extra training in surgery, obstetrics and anaesthesia.

5. The Family Practice Residency Program would need to develop teaching areas outside the University and its teaching hospitals to supplement the core program. There are certain learning objectives that are difficult to achieve in the environment of the teaching hospital and its associated Family Practice Unit. We have therefore developed a network of teaching practices and peripheral hospitals available to residents for parts of their training program. The teaching practices are located in many different communities in Ontario, and the hospitals include peripheral hospitals in and close to Toronto, as well as places like Sault Ste. Marie and Sioux Lookout.

DESCRIPTION OF THE PROGRAM

The Family Practice Residency Program at the University of Toronto is a two year program designed to train graduate M.D.'s as family physicians. Students normally enter the Program directly following the clinical clerkship. Eight adult teaching hospitals participate in the Program. Residents spend the entire two years of their training attached to one teaching hospital, but are assigned elsewhere for parts of their training. The Department of Family and Community Medicine has developed a comprehensive set of Curriculum Objectives[6] covering all aspects of the Residency Program. All teaching staff, both family physicians and consultant colleagues, are familiar with this document, and all residents are given a copy of the complete Objectives on entering the Residency Program.

The first year program is rotation-based. The resident is assigned to Family Practice for eight weeks of block time, and in addition returns to the Family Practice Unit once weekly for a half-day office session to follow his own group of patients. The hospital in-patient rotations include Internal Medicine (16 weeks), Surgery (4 weeks), Emergency (4 weeks), Obstetrics and Gynaecology (8 weeks), and Otolaryngology (4 weeks). Paediatrics (8 weeks) is conducted at The Hospital for Sick Children with one month being spent on an infant ward and one month in the emergency and outpatient department. The family practice residents are assigned to in-patient rotations that are orientated to the Objectives of the Residency Program. Weekly seminars are held at each Family Practice Unit for the residents at that hospital, and once a month all the family practice residents in the University of Toronto Program get together for a major central seminar.

In his/her Family Practice rotation, a resident sees patients in the Family Practice Unit with teaching and supervision from the family physicians in that Unit. An incoming first year resident will often "inherit" a group of patients from a graduating second year resident who has been their family doctor for the previous two years, or the patients may be assigned to the new resident by his supervising staff physician. At times the resident works on his own but his supervisor is always available to see a patient with him, to discuss the clinical problem and to advise regarding management. At the end of each office session, the resident and staff man review all the patients together. At other times the family physician teacher will directly supervise the resident by observing through one-way glass or by videotaping the patient visit. In this way the resident's skills in interviewing, counselling, examining, and treating patients are directly monitored and, hopefully, improved.

Our residents particularly enjoy the opportunity of caring for a small group of their own patients in their weekly office sessions over the two years spent in the Program. In a recent survey of the residents who have graduated from the University of Toronto Program since 1972, this continuing care experience was highlighted as being of particular value. It is the only opportunity afforded to a student during his/her entire undergraduate and postgraduate medical education to, for example, follow a prenatal patient through her pregnancy, do the delivery and then look after the baby; or follow the course of a patient with diabetes or hypertension; or help a patient to lose weight or stop smoking; or do serial psychotherapy sessions with a depressed patient.

In the second year of the Program, residents spend only six months in the hospital. Four of these months are at the home-base hospital – two months in Internal Medicine, and two months in Psychiatry, most of which is focused on ambulatory care. There are also two further months of paediatric training – one month at The Hospital for Sick Children in the outpatient area, and one month at a peripheral hospital which includes paediatric office experience.

The other six months in second year are spent in Family Practice and related electives. The two months of Family Practice block time may be in the Family Practice Unit or in a teaching practice similar to the type of medical practice the resident is planning for himself. The Family Practice weekly office experience continues through the second year and is of course in the Family Practice Unit where the resident's patients come for medical care.

The elective opportunities are many and varied. The residents plan these in consultation with the program directors. By second year most residents have a good idea of where they intend to practise, and the elective time is used to provide each resident with those learning experiences most helpful in relation to the intended type and area of medical practice. Popular electives currently are teaching practices, additional obstetrics, orthopaedics, anaesthesia, intensive care, various medical sub-specialties, Addiction Research Foundation, and Sioux Lookout.

Sioux Lookout is a northwestern Ontario community served by a Zone Hospital and satellite nursing stations accessible only by aircraft. The University of Toronto, through Professor Harry Bain and the Department of Paediatrics, has had a working relationship with Sioux Lookout for several years whereby residents are assigned to Sioux Lookout and teaching staff make regular visits. At the present time we are sending one second year family practice resident to Sioux Lookout each month. It is a great experience especially for residents who plan to practise in a remote area.

Second year residents are involved in a special series of seminars dealing with such topics as death and dying, family dynamics, marriage counselling, medico-legal problems, and the team approach to health care. Senior students from Nursing, Theology, Social Work, and Law come together with our family practice residents in these discussion groups. Our residents are finding these seminars of great interest and value because it gives them an opportunity to discuss some of these contemporary issues with students in other professional disciplines.

The second year residents, in groups of three, visit insurance companies in the Toronto area to develop an understanding of insurance underwriting and risk assessment. Similar opportunities are available to explore the field of industrial medicine. Each year the Department of Family and Community Medicine conducts a one-week course in practice management which covers all aspects of setting up and operating a medical practice.

A small number of residents (six in the current academic year) take a third year in the Family Practice Residency Program. Most of these young physicians are Stream C residents planning to practise in remote areas. As you might expect, they usually take extra vocational training in anaesthesia, surgery and obstetrics. Each third year resident has a program that is tailored to his/her own special training needs.

The staff of the Department of Family and Community Medicine have always been receptive to the needs of the residents in the Program. Two years ago, with the assistance of the staff, the residents organized themselves into a group known as F.R.A.T. (the Family Practice Residents' Association of Toronto). All the residents are members of F.R.A.T. and two representatives from each hospital serve on the Executive. Residents are appointed as members of departmental committees, and there is good two-way communication between staff and residents. F.R.A.T. helps to organize seminars and social events for the residents. The residents publish their own newsletter entitled "The Three Way Mirror". F.R.A.T. has also been instrumental in establishing lines of communication with the other Family Practice Residency Programs in Ontario.

SELECTION OF STUDENTS

The Family Practice Residency Program at The University of Toronto accepts students into the first year immediately following the clinical clerkship. Selection is done through the Canadian Intern Matching Service (CIMS) – a computer program available to graduating students under the auspices of the Association of Canadian Medical Colleges. Applicants for the Family Practice Residency Program are interviewed by at least one, and often several, of our teaching staff. We are not too interested in academic grades. We are looking for students who have a real interest in people, who have broad interests in medicine, and who have achieved in other areas of life outside of medicine. We try to select students who are highly motivated to a two or three year postgraduate program to train them for a career in Family Medicine.

For the past two years our Program has been totally filled in the CIMS match. In 1976 we shall have 65 first year positions, and by 1981 our projection is to have 115. This represents an intake equal to approximately 40% of the University of Toronto graduating class and, including the second and third year residents, would total approximately 250 trainees in the Program at any one time. The 40% figure is a little short of the Provincial Government's guideline that 50% of the graduating class of Ontario Medical Schools should be trained as family physicians.

The majority of the residents in our Program at the present time are graduates of the University of Toronto. We do encourage applicants from other universities and also often assist Toronto graduates interested in applying to Family Practice Residency Programs elsewhere, all in the sincere belief that all programs are strengthened if there is some mixing of students with different undergraduate backgrounds.

THE CERTIFICATION IN FAMILY MEDICINE

Students who have had an undergraduate clerkship that included Family Medicine and who successfully complete the two year Residency Program are eligible to sit the Certification Examination of The College of Family Physicians of Canada.

Residents are evaluated by staff on each rotation during the two years of the Residency Program. A more formal evaluation of each resident is done by the staff family physicians every six months. Residents are also asked to evaluate the learning experience as they complete each segment of the training program. These evaluations form the basis for the Program Director's recommendation regarding the resident's eligibility for Certification.

The Certification Examination itself is world renowned as one of the best evaluation procedures in the field of medical education. It uses three written and three oral examination instruments to measure the physician's competence in the three areas of cognition, attitudes and overall performance. The passing level is is preset to a standard rather than putting the marks on a Bell curve. Each year's examination is the result of one year of work by the Committee on Examinations of The College of Family Physicians of Canada. This committee numbers approximately 16 physicians with representation from coast to coast.

The written portion of the Examination takes one

full day and consists of a three hour 180 question multiple-choice examination, one hour of observation and interpretation of audio-visual material usually on a videotape, and three hours of patient management problems using the rub-out technique.

Each candidate has three types of oral examination. The Formal Oral is a 45 minute examination built around a clinical case presentation. In the Role Playing Oral, one of the two examiners plays the role of the patient. There are two Simulated Office Orals, and they utilize programmed actors or actresses as patients. All the examiners are family physicians and certificants who have spent the preceeding day preparing themselves to be examiners by studying their assigned part of the oral examination and standardizing scoring. During the oral examination portion of the Certification Examination process, every candidate is evaluated by at least five independent examiners.

The Certification Examination of the College of Family Physicians of Canada has only been in existence since 1969 and is offered once each year. In 1976 for the first time it will also be offered in the French language. The failure rate has varied from 17% to 34% in any one year. To date approximately 1,200 family physicians have been successful in obtaining their Certification in Family Medicine. Until recently most of the candidates have been practising family physicians, who are eligible to sit the Examination if they maintain their continuing education study credits for five consecutive years. The number of residents writing the Examination is increasing rapidly now as Residency Training Programs are expanding, and in another five years most of the candidates will likely be graduates of Family Practice Residency Programs.

FAMILY PRACTICE AS A CAREER

The great reward of Family Practice is the ongoing relationship with the people who become your patients. This is an experience that most other doctors miss.

If you like people, and if you can honestly say that you enjoyed all your undergraduate subjects approximately equally, and if your interests in life extend beyond medicine; then you probably would enjoy being a family physician.

If you do decide on a career in Family Medicine, then take the time to get good training. It is just as difficult to be a good family physician as it is to be a good cardiologist or general surgeon. One year of postgraduate training is not sufficient. The major reason for young physicians leaving general practice after one or two years is not an excessive workload or overly long hours or insufficient income, but rather a feeling of inadequacy to do the job expected of them because their training was inappropriate or too short or both. The Family Practice Residency Programs at the University of Toronto and elsewhere are not perfect by any means, but they do offer a good solid training for Family Practice, they are better than anything else available, and they are improving.

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TRAINING IN PSYCHIATRY
AT
McGILL UNIVERSITY

The Department of Psychiatry has openings for physicians with initiative, in the following program, effective July 1, 1976. Suitable opportunities may also be available before the above date for those wishing to apply now:

FOUR-YEAR DIPLOMA COURSE – provides basic and advanced training in psychiatry to suitable applicants who have graduated from Canadian medical schools and have completed a general North American internship; there are also a limited number of straight psychiatric internships. Because of recent Quebec policy changes, only a very few graduates of non-Canadian medical schools can be accepted; these must also have completed a general North American internship. Straight internships and residencies in medicine, neurology, pediatrics and psychiatry are recognized towards one year of training, if completed in an approved university-affiliated centre. Salaries range from $7,721 for interns and $8,786 for a first-year resident to $12,248, commensurate with credited years of training. These salaries are subject to change pending contract negotiations.

Other courses available for selected students:

a) Master of Science in Psychiatry – candidates may major in approved clinical or laboratory research projects, and are required to have finished at least three years in psychiatry before entering this programme.

b) Training in Psychoanalysis – recognized by the Canadian Psychoanalytic Society as leading to graduation as a qualified psychoanalyst.

Financial support for M.Sc. and Psychoanalysis has to be arranged by the student.

Applications should be made to:

The Co-ordinator of Postgraduate Education
Department of Psychiatry, McGill University
1033 Pine Avenue West
Montreal, Quebec H3A 1A1
Canada

Future Requirements for Family Doctors

I. W. Bean, M.D.
*C.M., C.C.F.P., F.C.F.P.**

"Medical manpower forecasting and planning are notoriously difficult . . . The demand for doctors has increased despite improved community health, because the prevalence of chronic disease has increased, affluence and better education – especially health education by the mass media – and the growth of specialization have increased demands. Moreover, an increase in the supply stimulates further demands". These are the observations of Dr. J. M. Last,[1] writing in the British Medical Journal in 1969. They are equally applicable today.

The need for Family Physicians cannot be viewed in isolation, but must be considered within the greater context of the total medical needs of the community. One cannot avoid referring to physician/patient ratios, although these are viewed as crude indices at best. With the increasing pressures on the health care dollar, the economics of physician manpower cannot be ignored. Can society collectively afford the kind of health services that governments have contracted to provide? How large a community is required to support a physician? Are the services cost effective? These are but a few of the questions that will require thoughtful answers in the future.

COMMUNITY NEEDS

The *proper level* of utilization of medical services in a community has yet to be defined. A good deal of statistical information is available on the medical services received in Canada; little or nothing is known about the health needs. Until means of measurement of unmet health needs are developed, they will remain undefined. There is as yet no good evidence that increased demands for medical services result in an improvement of health.

Some information may be gleaned from reviewing the utilization pattern (and therefore presumed medical needs) of the various segments of society as expressed in per capita costs of medical services. For example, the cost of poviding physician services to children under the age of four years, and adults over the age of sixty-five, is appromixately double the average per capita cost of the population at large. That is, these two groups receive twice as much medical care as the "average citizen". Females in the child-bearing years have a per capita cost of approximately 1.4 times the average. Further refinements may be done by age and sex utilization studies to provide additional data on utilization patterns which presumably reflect patient needs.

PHYSICIAN/PATIENT RATIOS

The accepted optimum physician/patient ratio established by the World Health Organization is 1:600. This ratio was relatively meaningless since its adequacy or otherwise depends on the nature of medical care that is given. More meaningful figures for physician/patient ratios for medical specialties have been established by the Royal College of Physicians and Surgeons of Canada in a report prepared by Dr. J. R. Gunton[2] in 1972. No "ideal" ratios exist for family physicians. A sub-committee studying Ontario manpower needs and reporting to the Postgraduate Committee of the Council of Ontario Faculties of Medicine (C.O.F.M.) recommended an ideal family physician/population ratio of 1 per 1800.

In 1973, the Canada Health Manpower Inventory[3] showed a ratio of general practitioner to population of 1 to 1,495. There is no indication that the selected 1 per 1800 was *ideal*. Allowing for variations in ages and sex, as well as for geographic distribution of physicians, I suspect that the 1800 figure could go plus or minus 300 in any one instance. The same report shows the attrition rate of active physicians (that is, those who were lost to practice) as 2.5%. This is in spite of a marked increase in immigrant physicians during the year. If one applies this rate to Ontario, assuming all other factors constant, and assuming that 50% of those lost to practice were family physicians, this would require an injection of 157 new family physicians into the stream to maintain our present ratios. If population growth continues at its present rate, an additional 127 per year will be required, making a total of 284 family physicians per year. Changes in immigration policies could alter the situation so that 50% of our present graduates could enter family practice as a career choice. This was the figure initially established by the Ministry of Health and the Ministry of Colleges and Universities.

The validity for this figure was expressed by Dr. R. A. Nelson,[4] President Emeritus of The Johns Hopkins Hospital in June 1975, when he observed, "In general it appears that a more balanced health service requires about half of the doctors working as general physicians". He noted further that in some countries when the proportion of doctors serving as family physicians dropped below this ratio, "Families must seek general care from specialists who are not trained or enthusiastic about this function and may perform it badly, certainly expensively, when viewed against the cost to society for their specialist training". In 1973, the number of general and family physicians in Ontario represented 40% of the physician population.

ECONOMICS

With the advent of universal medical services, *Parkinson's law* may be re-phrased: "The demand for medical services expands so as to fill the capacities of the physicians available to supply it". Thus, if one doubles a number of physicians, one doubles the cost of O.H.I.P. In a paper presented to the Pan-American Health Manpower Conference in Ottawa in 1973, Dr. J. R. Evans[5] estimated that for each additional five physicians there is $1 million more cost for the Health

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Care System. (Average gross income $50,000 and generated cost in health related services $150,000 per physician.) It is not difficult to understand why governments are interested in the subject of medical manpower.

There is little evidence to show that there is a *levelling off* of demand, or that a saturation point is reached. In England, when the economic barriers were lowered, this phenomenon was described as *the minor malady malignant*. A two year study to assess over-utilization of medical services in Saskachewan[6] concluded "that there was no obvious way that persons with trivial demands could be identified statistically. Professional review alone can evaluate whether the services should be regarded as necessary from a medical point of view". Our professional review committees can control over-servicing by physicians; we have no effective mechanism for controlling over-utilization by patients.

However, rather than attempting to analyze the overall costs of health care and the many factors which affect it, let us consider the population load required to support a family physician. If one accepts the figures of Dr. Kerr White[7] that 250 out of every 1,000 adults consult a physician during an average month, in order to generate an average gross income of $50,000 per year, it requires a patient load of approximately 2,500 *average adults*. Allowing for the age/sex distribution of the population, the average family physician could probably be supported by 1 per 1,500 to 1 per 1,800 patients. While these figures were originally generated in the United States, it is interesting to note that in Russia[8] they provide 1 general physician per 2,500 adults as well. This excludes Obstetrics and Paediatrics. The Obstetrics in Russia is conducted at the Poly Clinics by Obstetricians; the children are cared for by Paediatricians assisted by a feldsher and a Public Health Nurse in the ratio of 1 paediatrician per 800 children. It would thus appear that our ratio of one family physician per 1,495 patients in Ontario in 1973 is an economically viable figure considering the local patterns of practice.

One of the topics that will require careful consideration in the future will be alteration of the patterns of practice to achieve a greater degree of cost effectiveness. Much has been done, but the present trends must be continued. The role of the Nurse Practitioner is expanding. Many of the psychosocial problems which are seen by family physicians should be the purview of the social worker. Additional medical manpower can be mobilized by upward mobility of personnel and downward assignment of responsibility. Nurses, physicians assistants and technicians can absorb some of the important routine activities of physicians without the physician having to relinquish overall responsibility for the patient's health and welfare. The kinds of time/motion studies which have proven to be of value in other segments of the economy have rarely been applied to the Health Care System. For example, studies of the activities of four paediatricians in the U.S.[9] revealed that 50% of their working day was spent with well children, and 22% on patients with minor respiratory illnesses. Needless to say, the result was intellectual understimulation.

SUMMARY & CONCLUSIONS

I have purposely avoided the use of the descriptive term *Primary Contact Physician* in this presentation. As defined by the College of Family Physicians of Canada, a family physician is one who is trained to provide primary, continuing and comprehensive health care to any and all members of the family, using available ancillary and consultant services to ensure exemplary health care. A method of training to achieve this goal has been outlined by Dr. Perkin in his discussion of the Residency Program. Family Practice is no longer the absence of a specialty, but a program with defined educational content and academic goals. The indications are that there will be a continuing need in Ontario for physicians with this type of training, and that it will remain an economically viable entity.

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RAY F. FARQUHARSON MEMORIAL LECTURE

The ninth Ray F. Farquharson Memorial Lecture will be given at the Medical Sciences Building, Main Auditorium, University of Toronto, on Tuesday evening, February 17th, 1976 at 5:30 p.m.

The Lecturer will be Dr. Eugene D. Robin, Professor of Medicine and Physiology, Stanford University, Stanford, California.

His topic will be "Cell Pathophysiology: hypoxia without hypoxemia".

Dr. Robin will be the ninth Ray F. Farquharson visiting Professor of Medicine at the University of Toronto from February 15th to February 20th, 1976.

The Alexandra Park Community Health Centre: "Shout" Grows Up!

Valerie Gilchrist, 7T7
JoAnn McCall, 7T7

The Alexandra Park Community Health Centre (APCHC) in downtown Toronto is many things to many people. To the casual passer-by, it's a comfortable looking brick duplex at 62-64 Augusta Ave. with yellow curtains and a moth-eaten picket fence. To the families living in the Ontario Housing Corporation (OHC) project across the street, it's simply "the clinic", a favourite doctor, a cheerful, efficient nurse or a student volunteer who's become a special friend. For the students working at the centre, it's an opportunity to meet ordinary people with everyday health problems on their own terms, an experience that university classrooms and huge hospitals can't begin to provide. To our idealistic professional staff, it represents not only a chance to serve personally a deserving community, but is also an opportunity to communicate to the students a sensitive and realistic attitude toward community-centred health care. To the Provincial Government we're a constant source of confusion, an independent community health centre run by students. How unorthodox! To those of us responsible for managing the Centre, it has been one unnerving crisis after another as we've struggled to keep the clinics open and our program growing on an uncertain budget. But somehow we have stayed open, and it's hard to believe how much the program has grown.

FIG 1. Hot wax mittens followed by exercise will limber arthritic fingers during physiotherapy clinic.

The Alexandra Park community, immediately south and east of the Toronto Western Hospital and centred on a large OHC project, is largely a working class Anglo-Saxon and Black Canadian community. Many Chinese families are moving in from the east, and the single family row-houses to the north and west are owned mostly by young Portuguese immigrant families and elderly couples. The large apartment building at 91 Augusta is home for many senior citizens leading active, independent lives. Each sub-group in our practice has its own special problems: unemployment, welfare, broken homes and illegitimacy, chronic physical and emotional illnesses, addictions, social and cultural isolation. For many in the community, illness is simply one more bother, to be endured until it becomes so uncomfortable or incapacitating that the sufferer is dragged, usually unwillingly, to the emergency department of the nearest hospital. The distorted pattern of utilization in this area has meant that despite the large population in need of primary health care, private practitioners were forced to move to more affluent areas. Eventually Alexandra Park was left with only the Toronto Western Hospital to turn to for even the most trivial complaints. It was hardly an ideal situation.

In 1968-69, a group of politically aware U of T students began "SHOUT", mercifully short for Student Health Organization of the University of Toronto. Hoping to help fill the gap in services for this community, they opened a store-front Community Centre on Bathurst St. providing a limited program of health and counselling services. Soon they had marshalled enough support from public agencies and the University to open a larger clinic on Augusta Ave. with a dental clinic, a small family practice unit, a pharmacy and a legal aid clinic. From that modest beginning, we have nearly outgrown the two average-sized houses at 62-64 Augusta Ave. with a medical-dental centre serving over 1,000 patient visits each month, and involving three to four hundred students from six faculties in the teaching program each year. Our pharmacy still dispenses needed drugs at or below cost, but legal aid services have had to find a new home up the street at St. Christopher House for simple want of space. In the last year, we have become incorporated (non-profit status, of course) and face budget commitments in excess of $100,000 annually. Our political structure has changed dramatically as well. From strict student control, we are evolving into a real Community Centre, with area residents volunteering their time and energies. They sit on our governing board and meet with politicians and representatives of other Community Health Centres to define and protect the common interests of all such centres.

Many Community Health Centres have opened in the past few years, both here and in the United States, as an alternative to private enterprise primary medical and dental care. SHOUT-APCHC was one of the first, of course, but we are also, from all we can gather, the only such centre in either country with a student originated community service-teaching program. Our medical clinic looks rather like any well-equipped family practice unit during our daytime clinics, except for the presence of a few medical students working in our elective program in family practice under the supervision of our full-time family physician, Dr. D. Grove-White. These students receive instruction in techniques of physical examination and history taking as they get some idea of what it means to practice family medicine in a low-income urban setting. Although students in other U of T faculties find their daytime hours booked solidly with lectures, we have had nursing students from the nearby community colleges arrange elective experiences under the supervision of Ms. Henderson, our full-time R.N. But it's

the evening clinic teams that form the backbone of the medical teaching program. Four nights a week teams of Medical, Nursing, Rehabilitation Medicine and Pharmacy students at various levels of training hold an evening clinic under the supervision of one of our part-time physicians, all of whom have a special interest in teaching. Each student has an opportunity to use his classroom-acquired skills as the teams work up, treat and follow their own patients. It's a good chance to learn to function effectively as part of a team, and to learn how helpful the other specialties really can be. While it is sometimes a bit hectic, our patients seem to love all the attention, and many are regular and devoted patients of their favourite team. Each evening's session is closed with the presentation and discussion of each of the cases the Team has seen that evening. These discussions are supplemented by more specific information presented by the physician and senior students on the medical conditions involved, nursing and rehabilitation problems forseen and actions of any drugs prescribed. In all, the medical clinic is open five days and four evenings weekly, with Dr. Grove-White on 24 hour call. OHIP provides us with a modest "global" budget to cover the cost of our medical services to subscribers. Patients without OHIP coverage may pay what they can. The Pharmacy provides those of our patients who do not receive other drug benefits with drugs prescribed by either clinic at or below cost. It is our way of ensuring that our patients will really receive the drugs prescribed, free of charge if necessary, and be thoroughly instructed in their correct use.

FIG 2. Senior dental students do some of their best work on what the tooth fairy overlooked.

Much as we on the medical end of things may hate to admit it, probably the most valuable service the Centre provides this community is the dental clinic. Universal medical insurance has removed the economic barrier to primary medical care, but "Denti-Care" is still far in the future. In the meantime, our dental clinic provides all the services a modern private dentist can, from hygiene instruction to oral surgery and dentures, at about one quarter the cost. Through a long standing arrangement with the Faculty of Dentistry, all of the senior students in Dentistry and Dental Hygiene are rotated through our daytime dental clinics as part of their formal clinical training. They grind away five days a week under the supervision of Dr. Barrow, their full-time faculty instructor. While they work rather more slowly than a private dentist, their work is of high quality, as they can take their time to do the job right. The pace picks up during the evening clinics, however. Two evenings a week, the third and fourth year student volunteers run clinics, known occasionally to go until 2:00 a.m. in an effort to whittle down waiting lists. Their work is supervised by graduate dentists who volunteer their time as well. The student volunteers are also responsible for co-ordinating the entire dental operation, paying its bills and talking their suppliers out of equipment and donations. During the past summers, the dental clinic has been kept running all summer on Opportunities for Youth grants, employing up to fifteen dental students fulltime. The student-operated clinic has been so successful that the Faculty of Dentistry, formerly a a bit skeptical, is considering plans to establish a similar student-operated clinic as a more formal course in managing a dental practice. As our students have addressed meetings and conventions of dental schools and student organizations here in Canada and in the United States, they have found other groups impressed and excited by the work that has been done here, and it is probably safe to predict that similar programs will be started in other areas as well.

Community Health Centres, organized and administered by non-professionals representing the community to be served, will undoubtedly continue to multiply in the face of the Minister of Health's studied ambivalence and the open hostility of some segments of the medical profession. Citizen groups in lower-income communities are demanding that primary medical services be made as readily available in their neighbourhoods as they think they are in more prosperous areas. Salaried practice appeals to many young physicians who want to devote all their time and energy to practicing medicine, and are more than willing to leave the business worries to someone else. The government health planners, on behalf of the taxpayer, hope that the Community Centre system will ultimately provide a more efficient and economical delivery system. On the old-fashioned fee-for-service system, treating only sick people was profitable, and the successful practice of preventive medicine could quickly put a practitioner out of business. New funding programs are being designed to favour the practice that makes optimal use of non-physician personnel, and preventive health measures to keep patients healthy and out of the office. It will certainly take years to make the new programs workable, but in the meantime the existing Community Centre provides the experimental system in which to prove them. No matter what sort of system the Government's efforts finally produce, APCHC will continue

(continued on page 44)

Clinicopathological Conference

FAILURE TO THRIVE AND HEPATOMEGALY IN A FIVE MONTH OLD GIRL

T. D. Ruddy, 7T7
H-E. Schlosser, 7T7
E. Fischer, 7T7

PART I

CASE PRESENTATION

E.D. is a five month old girl admitted to hospital for failure to thrive and progressive hepatomegaly for four months. Her first admission to hospital was at age one month when she presented with vomiting, diarrhea and failure to thrive. She was emaciated and had poor tissue turgor, slightly sunken eyes and a sick, yellow appearance. The liver was palpable one centimeter below the costal margin. Laboratory investigations showed normal serum electrolytes, sweat chlorides 14.5 meq/l, and low random blood sugars of 28, 35, 37, 38 mg per cent with two of 60 mg per cent. An upper GI series was normal. The final diagnosis was gastroenteritis and questionable failure to thrive, and she was discharged on Enfalac formula.

At two months of age E.D. presented with a runny nose, cough and poor feeding. She had gained one pound since birth and still had loose stools. She was a thin, weak-looking baby with a feeble cry. The liver was palpable two centimeters below the right costal margin. A diagnosis of pneumonia was made on the basis of bilateral basal rhonchi, a few coarse crepitations, indrawing bilaterally and chest X-ray findings. Investigations yielded a normal IVP, EEG and serum protein electrophoresis, no urine ketones or glucose, and a negative PKU test. She was put in a croupette with moisture and given Trulfazine and she improved.

At three months of age E.D. was admitted for investigation of hepatomegaly. The liver was now six centimeters below the right costal margin. The abdomen was distended and a lack of subcutaneous tissue was noted. Large labia and a prominent clitoris were also observed. Liver function tests showed the following results: van den Bergh total 1.52 and direct less than 0.30 mg per cent; SGOT 23 IU; alkaline phosphatase 22.7 U; BSP 6 per cent. Serum cholesterol was 210 mg per cent and total serum triglycerides were 440 mg per cent. Adrenaline and glucagon tolerance tests were normal. Soft tissue x-rays of the extremities showed a lack of subcutaneous fat. Chromosome studies revealed the normal female 46/XX pattern. The Wasserman test and toxoplasmosis complement fixation tests were negative. No definite diagnosis was reached.

At five months of age (fourth hospital admission) the liver was seven centimeters below the right costal margin. The serum was very milky, and investigation of blood lipids showed total lipids 770 mg per cent (normal), phospholipids 555 mg per cent (normal), cholesterol 148 mg per cent (normal), and triglycerides 440 mg per cent (elevated).

The results of glucose tolerance testing (GTT) on each admission are shown in Table 1.

TABLE 1

RESULTS OF GLUCOSE TOLERANCE TESTING (GTT)

Blood glucose values (mg per cent) with insulin levels (μU/ml) in brackets.

Time / Age	fasting	30 min.	1 hr.	2 hrs.	3 hrs.	4 hrs.
1 mth.	50	103	169	172	34	–
2 mths.	68	118	66	68	34	–
3 mths.	66	94	81	87	60	–
5 mths.	70	82	80	60	58	–
3 years	57	69	84	66	95	57
	(250)	(620)	(600)	(>1000)	(115)	(95)

DISCUSSION

This infant presents as a problem of hepatomegaly and failure to thrive.

The early admission, in which diarrhea and failure to thrive were prominent, entail a consideration of the various malabsorption syndromes. Cystic fibrosis is the commonest cause of intestinal malabsorption in children. Occasionally, gastrointestinal symptoms may be severe and pulmonary symptoms mild or absent. These children overeat but do not gain weight normally, and have frequent diarrheal stools and steatorrhea.[1] However, the sweat chloride determination was normal in this case.

Celiac disease is the second most common chronic malabsorption syndrome in childhood, with onset within the first two years of life but unlikely to present before 3 or 4 months of age when solid food with gluten are added to the diet. There is chronic diarrhea, irritability, vomiting and failure to thrive. Abdominal distention is present, with decreased subcutaneous tissue, wasted proximal musculature, smooth tongue and dependent edema.[2] Infectious malabsorption, of which *Giardia lamblia* is an example, should also be considered but would be very unlikely at this age.[3] Other causes of malabsorption are congenital bowel malformations. However, a GI series was normal and no evidence of trophozoites was found in the stool.

Hirschprung's disease (congenital megacolon) results in abdominal distention and spurious diarrheal discharge.[4] Again on the basis of the normal GI series this diagnosis can be eliminated. Disaccharidase deficiency can result in abdominal bloating and diarrhea, but the symptoms are likely to be pronounced after feedings.

The normal female pattern karyotype makes the possibility of chromosomal abnormalities unlikely, but does not eliminate this possibility.

The diencephalic syndrome is an important consideration in those patients with failure to thrive and lack of subcutaneous fat. It is a condition which arises from tumours or other destructive lesions in the area of the

the hypothalamus. Emaciation is present despite adequate food intake, and the child is overactive. Autonomic dysfunction manifests as excessive sweating, flushing, tachycardia and vomiting. Soft tissue x-rays reveal an absence of the subcutaneous fat shadow in the extremities, and fasting hypoglycemia is present.[5] In this case the EEG and subarachnoid taps were normal and the fasting blood sugar was normal after one month (Table I).

Hepatomegaly and some of the abnormal liver function tests bring to mind the possibility of hepatoblastoma, a fairly common type of primary liver tumour of infancy but a very rare cause of hepatomegaly. However, no evidence of mottled calcification was seen on x-ray examination.[6]

An undersized and pale child with a fat face and neck, distended abdomen and hepatomegaly without ascites or splenomegaly may be the presenting clinical features of the glycogen storage disease, glucose-6-phosphatase deficient hepatorenal glycogenesis. Lipemia associated with xanthomata may be a feature of this disease. Hypoglycemia underlies the occasional occurence of seizures and vomiting, and central nervous system deterioration usually results. Laboratory investigations show fasting hypoglycemia, hyperlipidemia, anemia and hyperlacticacidemia. The fall of blood glucose levels may be delayed after infusion of glucose. Definitive diagnosis is made on the basis of biochemical analysis of liver biopsy material.[7]

In this case one must also rule out some of the common congenital infections: the Wasserman test for syphilis was negative, as was the complement fixation test for toxoplasmosis. Rubella, cytomegalovirus, and herpes virus are also commonly involved.

This case proved to be a difficult diagnostic problem. The clinical data of hepatomegaly and striking lack of subcutaneous fat observed grossly as well as radiographically, and the laboratory data of a flattened glucose tolerance curve and lipemia, strongly suggested the diagnosis of generalized lipodystrophy. Subsequent developments were to prove this diagnosis.

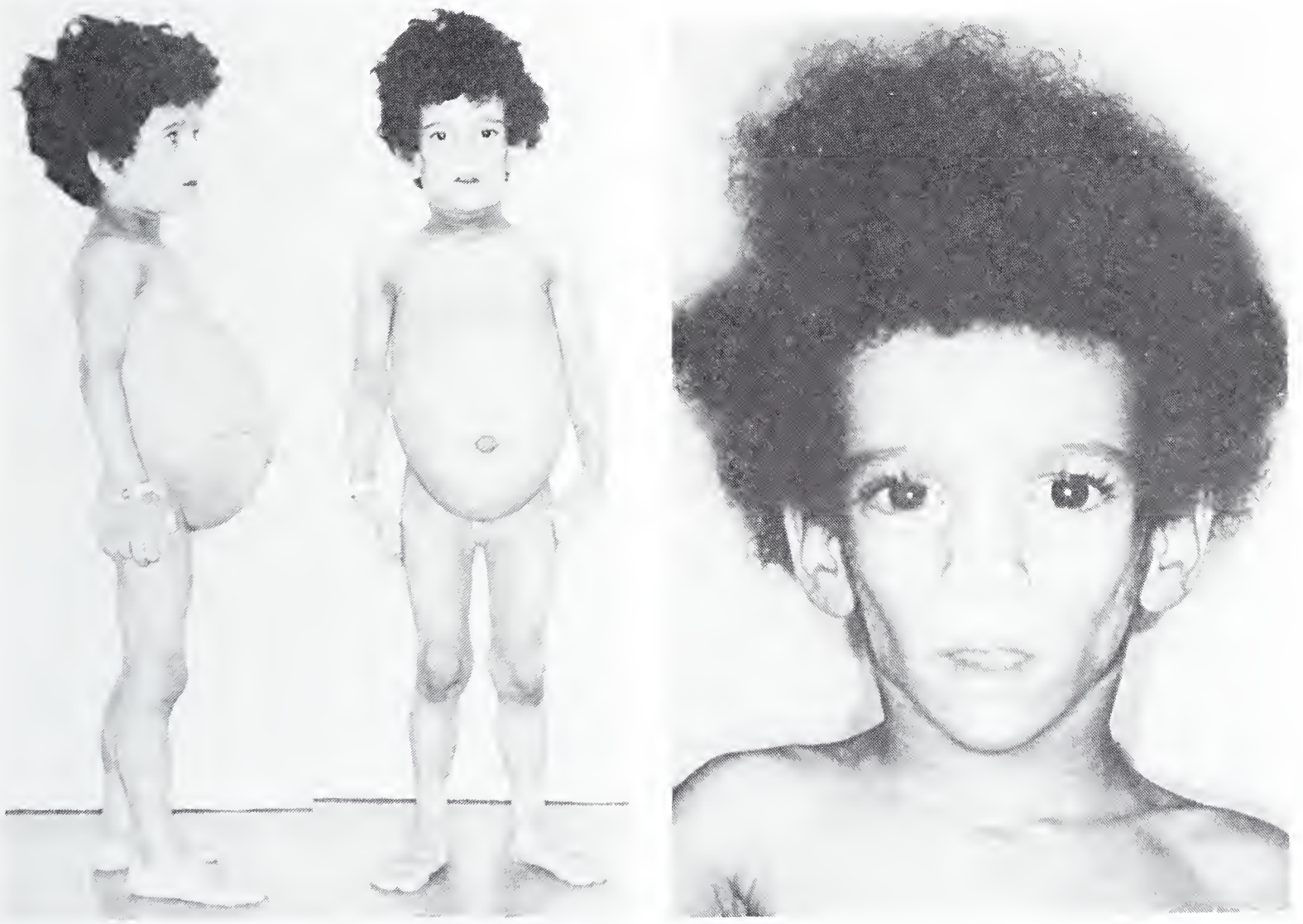

Figure 1, 2: *E.D. at age three years, five months.* Features of generalized lipodystrophy include the protruberant abdomen, hepatomegaly, lack of subcutaneous tissue, venous prominence (especially in the extremities), gaunt facial features, dark curly hair, hyperpigmentation in the axilla, neck folds, groin, knees and umbilicus, and the suggestion of hypertrichosis.

PART II

CASE PRESENTATION

At the age of two years E.D. was admitted to hospital with pyoderma. A glucose tolerance test at that time was flat for glucose levels, but insulin levels rose from 80 to 430 μU/ml (normal levels do not exceed 150 μU/ml after a glucose load). Muscle and skin biopsies were compatible with lipodystrophy.

At age three she was described as looking older than her age with a narrowed face, dark curly hair,

low set ears, and a relatively large head (circumference 53.5 cm). She had hyperpigmentation prominent over the folds of her neck, axillary folds, knees and groin. She had prominent veins with no subcutaneous fat demonstrable. The abdomen was markedly distended. The smooth, firm, non-tender liver was palpable 13 cm below the right costal margin in the mid-clavicular line and to the umbilicus in the midline. Spleen and kidneys were not palpable. The child also had mild muscular prominence. Results of a glucose tolerance test were as shown in Table 1.

Five months later E.D. was again admitted for dietary control of her lipemia. Different diets including high carbohydrate and high fat were tried. It was concluded that her hypertriglyceridemia was not carbohydrate-induced and worsened with fat consumption. She was discharged on a relatively normal diet with restricted fatty and fried foods and increased choline intake. (Choline is a lipotrophic agent, a precursor of lecithin which forms part of the very low density lipoproteins (VLDL) which carry triglycerides out of the liver.) A liver biopsy done during this admission revealed marked histologic alterations. (Figure 3)

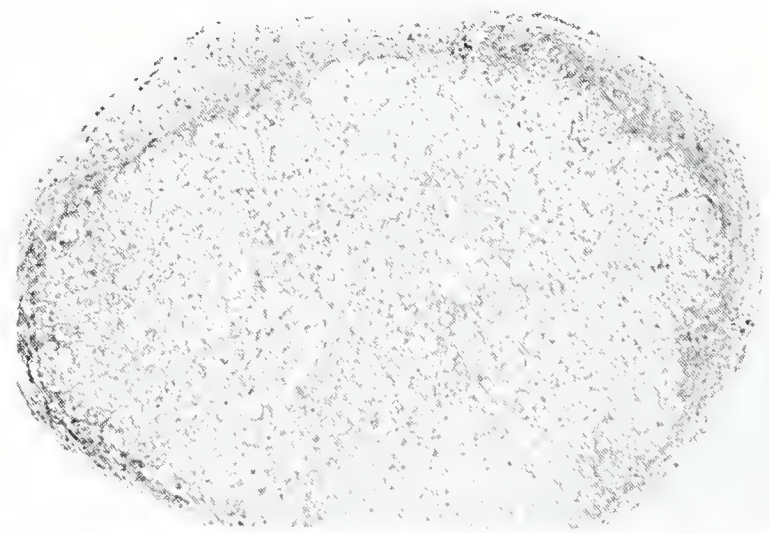

Figure 3: *Needle biopsy of liver, PAS stain, magnification 115X, Age 3 years and 5 months.* Almost every liver cell is distended with a huge vacuole. Many of these vacuoles almost completely displace the cytoplasm and nucleus of the liver cells. In some places there are small fatty cysts. A relatively small amount of glycogen is present. In the portal triads there is a definite increase in fibrous tissue and some proliferation of the bile ducts. The epithelium of the bile ducts is somewhat irregular and a few ducts contain inspissated material. Fat stains show the liver cells to contain a large amount of neutral fat and also a considerable amount of doubly refractile material.

The patient is now ten years old and was admitted for a baseline assessment of her condition. She is known to have generalized lipodystrophy, and is in the seventy-fifth percentile for height and ninetieth percentile for weight. Endocrine studies were done, and the GTT showed a flat glucose response curve with high fasting blood sugar, high insulin levels and low growth hormone (GH) levels (<1 mμg/ml throughout six hours of the test). This is consistent with insulin-resistant diabetes. An insulin tolerance test showed no decrease in blood sugar and a slight rise in GH with insulin administration. ACTH stimulation test showed an increase in plasma cortisol levels starting at thirty minutes and peaking at sixty minutes after injection. Blood triglycerides measured 504 mg per cent and cholesterol was 184 mg cent - indicative of Type IV Hyperlipidemia.

Results of investigations for hepatomegaly are shown in Table 2. The presence of extensive cirrhosis was demonstrated by the liver biopsy and splenoportogram.

TABLE 2

Results of Investigation for Hepatomegaly

Alkaline phosphatase	171 units (normal for age 10-13, 134 to 372 units)
SGOT	28 IU (95th percentile of normal 24 IU/1)
Total protein	9.0 gm per cent (normal 5.3 to 8.0 gm %)
Electrophoresis: β-globulin	1.15 gm per cent (normal 0.3 to 1.2 gm %)
γ-globulin	2.0 gm per cent (normal 0.4 to 1.4 gm %)
Bilirubin total and direct	Normal
Plain film of abdomen	Large soft tissue mass in the upper abdomen representing enlargement of liver, spleen and kidneys.
Barium swallow	Suggestive of small varices in the lower esophagus.
Liver biopsy	Fibrosis, fatty infiltration and and bile duct proliferation with no necrosis or inflammation (Figure 3)

Renal function was investigated, and two 24-hour urine collections showed excretion of 252 and 369 mg per cent protein. An IVP showed prompt excretion of the dye with normal upper collecting systems, bladder and ureters. However, both kidneys were larger than normal in size.

DISCUSSION

One of the ways to investigate the function of an organ or organ system is to observe the function of the body in the absence of that organ system. Generalized lipodystrophy is a rare but intriguing disease because it provides such a model for investigation of adipose tissue. There have been several hypotheses for the etiology of this disease and the development of metabolic disturbances found.

By age ten this patient demonstrates many of the features commonly found in generalized lipodystrophy. The name "generalized lipoatrophy" is sometimes used, signifying the total loss of subcutaneous, mesenteric, retroperitoneal and epicardial fat. Others features this patient demonstrates include hepatosplenomegaly, hypertriglyceridemia, insulin-resistant diabetes mellitus without ketosis, hyperpigmentation, dark curly hair, abdominal protruberance, muscle hypertrophy (apparently accentuated on inspection by the absence of subcutaneous fat), and mild hypertrophy of external genitalia. An accelerated skeletal growth can also occur. Even though the patient was below normal growth levels at a very early age, by age ten she is in the

seventy-fifth and ninetieth percentiles for height and weight respectively. Hypertrichosis may also be noted. Hypermetabolism in the presence of normal thyroid function can also occur. The course of the disease may be indolent or progressive. Death is usually due to renal failure secondary to microangiopathy of the kidneys, or the result of cirrhosis of the liver.

One hypothesis attempting to explain the effects of generalized lipodystrophy postulates that the primary lesion is the decreased amount of subcutaneous fatty tissue which results in the uptake of all excess calories by muscle, liver and other viscera. The lesion may involve a high turnover and release of fat or an enzyme blockage in the transfer of fatty acids into fat.[8] Fifty to eighty per cent of the human storage capacity for ingested carbohydrate is lost because of the lack of adipose tissue. An increase in insulin requirements ensues, leading to pancreatic exhaustion and overt diabetes. If this disorder is an adipose cellular defect, the resulting inability to store fat due to the absence of a functioning adipose organ can explain the eventual hyperglycemia, hyperlipidemia and enlarged fatty liver, but not the other manifestations.

E.D. had a hyperinsulinemia before she developed diabetes. In a study by Oseid,[9] six patients with generalized lipodystrophy were shown to have flat glucose tolerance curves and slight hyperinsulinemia in infancy and childhood. By ages eight to ten, glucose tolerance decreased rapidly as immunoreactive insulin (IRI) levels became markedly elevated. By age twelve when longitudinal growth ceased in one of his patients, diabetes developed and IRI levels dropped as the β-cells of the pancreas were exhausted.[9] This hyperinsulinemia, which is present from an early age, suggests either the presence of an insulin antagonist that eventually causes a hypersecretion of insulin from the β-cell, or the continuing stimulation of insulin by persistent hyperglycemia. Cerasi and Luft[10] postulate that the defective insulin discharge found in these conditions is due to an alteration in the specific receptor of the β-cell for glucose leading to the inability of the cell to recognize hyperglycemia as a stimulator of adenyl cyclase activity.

Several researchers have commented about the possibility of an insulin antagonist. Oseid[9] thinks it is unlikely that a circulating inhibitor exists since biological studies of the sera of patients with lipodystrophy show high insulin activity. However, he also suggested the possibility that an inhibitor with higher species specificity than insulin itself may exist and that the kinetics of its binding to the peripheral tissues might be different from that of insulin.[11] There is also the suggestion that proinsulin may be involved giving high total IRI levels. This has not been studied.

Louis et al[12, 13] isolated a polypeptide from the urine of four patients with generalized lipodystrophy and one obese patient with mild diabetes that produced hepatosplenomegaly and hypoglycemia in mice, and hyperglycemia (an effect antagonistic to insulin) in humans and dogs. This material was absent from the urine of twenty-one normal subjects and an unstated number of diabetics.

Another interesting hypothesis regarding the etiology of lipodystrophy is abnormal hypothalamic-pituitary function. In a study by Mabry,[14] the pituitary and target gland functions in his patients were normal; however, the pituitary did not respond to arginine stimulation with the appropriate growth hormone release. Hypothalamic hormones were found in the plasma of such individuals but not in controls. Perhaps these hormones have a direct effect on peripheral tissue, an effect not mediated by the adenohypophysis. The hypothalamic-releasing factors have only been found in the plasma of these patients and hypophysectomized individuals. Mabry[15] also showed that hypophysectomy fails to improve the course of patients with generalized lipodystrophy. Although there is a temporary reversal of symptoms including decrease in liver size, pigmentation, hyperglycemia and insulin resistance, the original condition recurs after nine months aggravated by the added lack of hypophyseal function.

Another hypothesis exists whereby GH or a GH-like substance acts as a fat mobilizer. Increased GH would cause the height and weight age to exceed bone age in these children, since GH affects linear growth but not bone growth.[16] The substance could also account for the hypertrophy of muscles, external genitalia and kidneys, the need for increased insulin, and the later development of diabetes, with stimulation of hair growth and pigmentation as lesser effects.[17] In support of this theory, Young[18] has shown that anterior pituitary extracts cause excess growth without diabetes in growing puppies and kitten, and diabetes in older dogs and cats.

Not only does the etiology of this disease remain puzzling, but the metabolic disturbances that occur are difficult to explain. For instance, the insulin-resistant diabetes in lipodystrophy is not accompanied by ketoacidosis. Is this because there is not enough adipose tissue to mobilize fatty acids, or because there is too much insulin in the circulation for adipose tissue lipolysis?

Havel[19] has offered some explanations for the metabolic disturbances. He says the development of a fatty liver probably results from diversion to the liver of fatty acids produced during hydrolysis of triglyceride-rich plasma lipoproteins that are normally stored in adipose tissue. He also suggests that the hyperlipemia results from stimulation of hepatic production of triglyceride-rich lipoprotein consequent to the increased influx of fatty acids. The hyperlipemia may also reflect retention of lipoprotein-triglyceride in the blood; this could be related to the ineffective stimulation by insulin of lipoprotein lipase in adipose tissue cells, or to ineffective storage of the resulting fatty acids in adipose tissue. In our case E.D. was found to have no lipoprotein lipase at age two and initially had a Type I Lipoproteinemia. Eventually she developed a Type IV Lipoproteinemia.

Knowledge of the basis of the metabolic disturbances would permit a clearer picture of the function of adipose tissue, insulin and other hormones possibly involved. With an understanding of the etiology of generalized lipodystrophy, one might offer a better prognosis for this rare and, as yet, untreatable disease.

(continued on page 44)

The "Learning" Pills

Rodger Hines, M.D.

"Doctor, you've got to do something with Billy. He's fighting with his brothers. He comes home from school with his clothes torn. The teacher's even been phoning that he's causing all sorts of trouble in class".

"How do things seem to you, Bill?"

"Well, they've always been picking on me and Mr. Lloyd is always talking about dumb things".

We went over some of his problems as he saw them, and arranged for a followup appointment. A mild "learning" pill was suggested for the interval. Two weeks later:

"How have things been, Bill?"

"They're a lot better. The kids have learned to behave much nicer".

"How come they were the ones that learned to be friendlier, when you were the one that took the pills?"

(Long pause)

"I guess it must have been me all the time".

This episode demonstrates the thesis that the prescribing of tranquilizers can be combined by the therapist with an expectation that the patient will develop insight and that their judicious use can facilitate the development of more positive behaviour.

Jim Hackett described himself as a high-powered executive – an engineer by profession. In his mid-forties, he had worked his way up the ladder in a large engineering firm and currently was living a life of tension in a fast-moving environment. He had moved recently and wanted a renewal of his usual 10 mg nightly tranquilizers. It was easy to see how this habit had developed.

Like so many people in a variety of settings, Mr. Hackett had developed a life-style and behaviour pattern that had become so stereotyped in negative ways that he and his circle of contacts were all expected to function in an atmosphere of recurrent crisis. With his many concerns showing only on his face and in his manner, Hackett's co-workers spared themselves and him the painful explosions that would occur if they mentioned even minor problems. Instead, they waited until the warning signals grew into serious events – and then faced the inevitable (and would say in exasperation) "Why didn't I hear about this earlier, when I could have prevented it?" – the cry of an otherwise capable person caught blindly in a mesh of his own contriving.

Instead of the larger amount of bedtime Diazepam he was requesting to quiet the frustrations of the day, Jim Hackett was encouraged to take a very small amount twice during the day regularly, and an intermediate amount at bed. In a month's time, he reported a significant change in himself and in his staff. He found that they were starting to come to him with less hesitancy. Although he was aware of still having plenty of things on his mind, he found that he could give his attention to anyone presenting him with a problem, make helpful comments, and then carry on with his own affairs.

With this improvement noted, Jim was encouraged to recount several specific episodes which he had handled well – and he was asked how he would have responded in the past. He soon realized that the pills themselves had not produced the more effective responses. They had only helped him to mobilize his own potential for positive behaviour.

As with many patients (and many doctors), Jim had been concerned that he might get "hooked on drugs" or that he would only be "hiding in the pills". To avoid these problems and to activate his involvement on his own behalf, it was suggested that he spend a few minutes each day clarifying those improved elements in his transactions that had led to successful outcomes.

As he built up confidence in his attitudinal abilities and as he increased his memory-bank of pre-taped "cool responses", Jim found that he began forgetting to take the mid-afternoon pill. As these constructive processes have become consolidated, he now finds that he rarely takes any pills. When anticipating tense moments, or after an unexpectedly disturbing event, he still takes a very occasional 2 mg Diazepam.

Jim Hackett's original situation is an example of a pattern seen very commonly by family physicians. Some people seem to start the day unconsciously assuming that there will be friction building to outbursts with others during the day. Others in their environment have come to take for granted the aura of turmoil surrounding these individuals. The expectations of each serve to heighten tensions so that misunderstandings and poor performance result – this confirming the expectations for the next day. Some blame themselves for inadequacy; some blame associates; others blame fate. Some will admit to one of these agents outwardly, while believing another inwardly. "Blame" is rarely a helpful concept in these situations.

The deep panic of the patient's "accelerating whirlpool" feeling, often present at the first contact with a physician, can gradually be replaced with quietly positive expectations – at first, expectations of the therapist – then, of the individual. If we accept the original assumption that the patient's situation is beyond his capacity to change, we confirm his conclusion. If our attitude reflects a belief that the individual can learn new behaviour responses, this persistent reassurance is often enough to initiate a feeling of optimism and positive expectations in the patient.

It is postulated that several of the psychotropic medications may be used in small quantities* with the addition of the expectation of the therapist for the development of insights and new behaviour patterns. These may well require time to develop and will need contact, at intervals, with a therapist who is prepared to see a growth potential in the patient.

(continued on page 44)

Book Review

*H. Schachter, M.D.**

REVIEW OF PHYSIOLOGICAL CHEMISTRY
Published by Lange Medical Publications (Harper)
(569 pages) $10.00

Lange Medical Publications has for several decades produced a most useful series of soft-cover medical texts covering both pre-clinical and clinical topics. *Review of Physiological Chemistry*, 15th edition, 1975, maintains this tradition by being a book designed primarily for the medical student. Although it is supposedly a "review", it is in fact a fairly large book (569 pages) but it differs from the standard biochemistry texts (such as Lehninger's *Biochemistry)* by using a much more compact style and relying heavily on tables and diagrams. This makes it somewhat more difficult to read than a book such as Lehninger but offers the advantage of a lower price and greater emphasis on topics of medical importance.

It can be said quite emphatically that the Lange book has more than enough of the relevant information necessary for a test in Period IB Biochemistry. Students should be able to use it instead of Lehninger but may not find it as readable; there is *no* need to buy *both* texts.

The book is very up-to-date and often presents new advances in great detail. However, the general core of biochemistry is presented in a rather compact style, as mentioned above. For example, Chaps. 1-4 on structures and Chaps. 13-16 on metabolism have all the information needed by the medical student but the text is occasionally quite terse. Nevertheless, Chap. 3 has excellent sections on protein structure, a topic covered in some detail in Period IB Biochemistry. Similarly, there are good sections on enzymology (Chap. 8), biological oxidation (Chap. 9), control of carbohydrate metabolism (Chap. 13), and lipoproteins (Chap. 14), all topics of importance to the medical student.

The text will also serve as a source of useful information in Period IB Medical Genetics (Chaps. 4, 5) and in the Gastro-Intestinal (Chaps. 12 and 17), Respiratory (Chap. 11), Renal-Electrolytes (Chaps. 18, 19) and Endocrine (Chap. 20) systems.

Finally, the text throughout emphasizes relationships between biochemistry and topics of medical interest such as physiology and pathology.

---

* Professor, Department of Biochemistry, Faculty of Medicine, University of Toronto.

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Adhesives in Surgery: Inducing Adhesion of Synthetic Polymers to Biological Tissues

Dennis H. G. Forrester,
B.Sc. Eng., M.A.Sc., 7T8

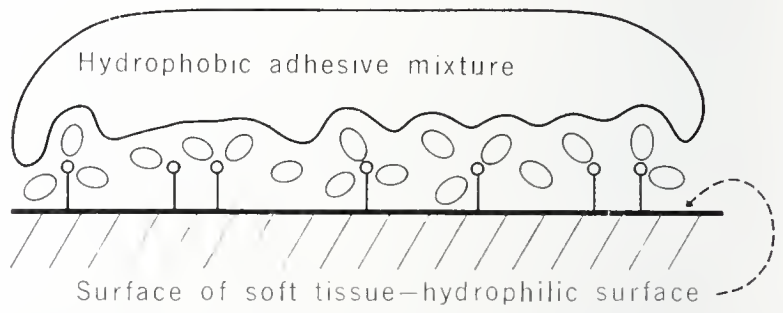
Materials of plant and animal origin have been used as tissue adhesives and coatings for many years. However, the poor water resistance of these materials and the lack of sufficient information about the adhesion process have limited their application in surgical procedures. Recently, the study of adhesion in the biological environment has received increasing attention in investigations related to surgical adhesives, marine fouling, dental restoratives, extracorporeal circuits and prosthetic implants.[1, 2, 3, 4]

Surgical adhesives have shown great promise when used in conjunction with sutures for the anastomosis of ductile structures and in restraining hemorrhage of injured parenchymal organs such as the liver.[5, 6, 7, 8] Recently developed surgical adhesives and coatings include the alkyl-2-cyanoacrylates, the polyurethane adhesives and the gelatin-resorcinol-formaldehyde mixture. The chemical characteristics of these materials have been studied quite extensively.[9]

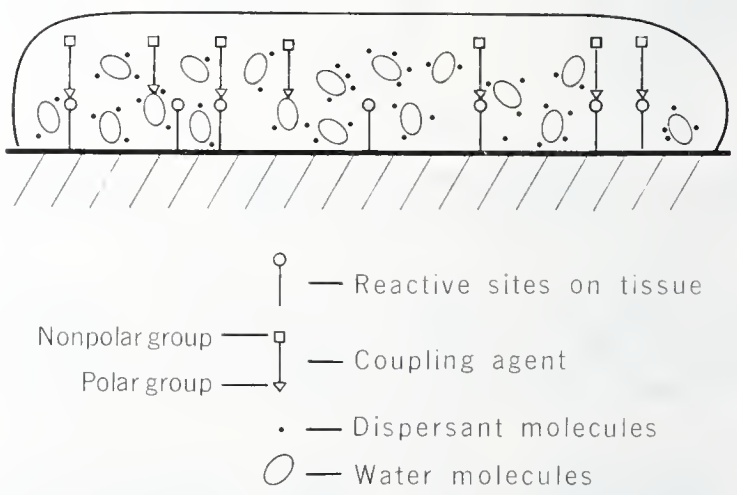
The advantage of closing surgical wounds with an adhesive material rather than with conventional suture or staple methods are very appealing. Mechanical deformation of the tissue can be considerably reduced, since tissue adhesives can provide uniform stress distribution over the area of the wound. The damage to tissue which results from the use of sutures is also eliminated and more delicate surgical procedures can be undertaken. This would be an obvious advantage in microsurgery. On the other hand, whereas the strength of wounds held by sutures can be adjusted by varying the depth, distance from the incision site and number of sutures used, the strength of wounds closed with adhesives is limited by the adhesive and cohesive properties of the applied adhesive agent. The strength of the cell layers in contact with the adhesive is also a limiting factor. Thus the use of surgical adhesives would appear to offer the surgeon less flexibility in adjusting the bond strength of the wound. This is, however, not entirely true, since the adhesive bond can be adjusted by varying the composition of the adhesive mixture.[10]

Adhesion to biological tissue has been limited by the fact that soft tissues are essentially composed of collagen, which is swollen in the biological environment. If a synthetic polymer adhesive is unable to react with, dissolve, or displace the adsorbed water on the hydrophilic tissue substrate, adhesion will be weak. These problems have been overcome to a certain extent by pretreatment of the tissue with various chemical agents, known as coupling agents.[11, 12]

Coupling agents promote adhesion to a hydrophilic surface by adsorbing to and altering the physicochemical properties of the surface, thus facilitating interaction with the liquid adhesive (by physical or chemical forces). In adhesive systems, the coupling agent forms low molecular weight fraction and contributes to the adhesive linkage, while the high molecular weight synthetic polymer contributes to the cohesive strength of the adhesive mixture. The coupling molecule should contain one or more polar groups capable of adsorbing to the surface of the biological tissue by strong physical or chemical means. The desired wetting properties can be obtained by incorporating an appropriate group at the opposite end of the molecule which is exposed at the surface (Figure 1). In addition, the coupling agent should be highly resistant to displacement by solvents or other substances in the liquid adhesive. When a chemical reaction occurs between the coupling agent and the tissue, it is important that the linkage formed should have a high hydrolytic stability in the moist biological medium to prevent deterioration of wound strength.



(a) Hydrophobic adhesive alone



(b) Adhesive mixed with water dispersant and coupling agent.

FIGURE 1: Use of Water Dispersant and Coupling Agent to Promote Adhesion to the Surface of Soft Tissues.

Investigations on the induction of adhesion to soft tissues have led to the formulation of a theory to explain the adhesion of synthetic polymers to biological tissues.[20] The theory proposes that the process of adhesion on biosurfaces is a composite of two events. The first step is an effective coupling reaction which is kinetically controlled and preceeds solidification of the adhesive matrix (Figure 2). The second step involves interaction between the cohesive polymer matrix and a suitable coupling agent attached to the

tissue surface (Figure 1). No chemical reaction is necessary between the tissue and the polymer. The most important step appears to be conversion of the hydrophilic groups on the surface of the tissue into groups compatible with the polymer adhesive. This is accompanied by the formation of a chemisorbed monolayer on the surface of the tissue. This layer is probably discontinuous in nature but is sufficient to permit adequate microscopic wetting of the tissue surface by the polymer adhesive. This theory has been substantiated by various studies using various coupling agents and adhesive systems.[20]

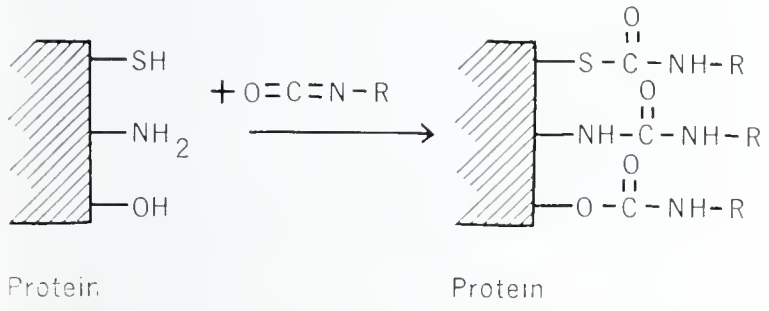


FIGURE 2: Reaction of Isocyanate Coupling Agent with Nucleophilic Groups on biological tissues.

There are several methods for determining the strength of wounds closed with surgical adhesives. However, there is at present no standardized procedure. Consequently, the available data cannot be readily compared. The procedures used by Cooper,[13] Woodward,[14] and Sussman[15] required isolation of the adhesive-tissue bond from the test animal, whereas the methods used by Leonard[16] and Skornik[3] were, in effect, peeling tests of the adhesive-tissue bond *in vivo*. There is an obvious advantage in the use of *in vivo* methods since isolation of the tissue from the animal may result in denaturation of proteins and other changes in the surface which can influence the bond strength.

The strength characteristics of a wide variety of biological materials have been extensively investigated by Yamada et al.[17]

TABLE 1

Bond Strength of Methyl-2-Cyanoacrylate Adhesive[9]

Tissue	*Bond Strength*	*Period Before Testing*
Beef Lung and Muscle	140 gm/cm^2	15 min
Rat Skin Tissue	1100 gm/cm^2	3 hr
Rat Skin Tissue	167 gm/cm	1 hr
Rat Skin Tissue	61.7 gm/mm^2	14 days
Rat Skin Tissue	152 mm Hg/1.5 in	48 hr

Of all the adhesive materials studied, the cyanoacrylates are probably the most widely investigated (Table 1). This may be attributed to their ability to polymerize rapidly and form strong bonds on biological substrates, thus introducing a time saving element. It has been found that the bond strength of incisions closed with cyanoacrylate and isocynanate homologues increases as the length of the alkyl ester chain increases from the methyl to the heptyl homologue[16] (Figure 3). One explanation suggested for this phenomenon is that in order to induce maximum adhesion to the tissue a certain balance between the hydrophilic and hydrophobic nature of the coupling agent must be present. It is apparent that the lower homologues are too hydrophilic, while the higher ones are too hydrophobic.

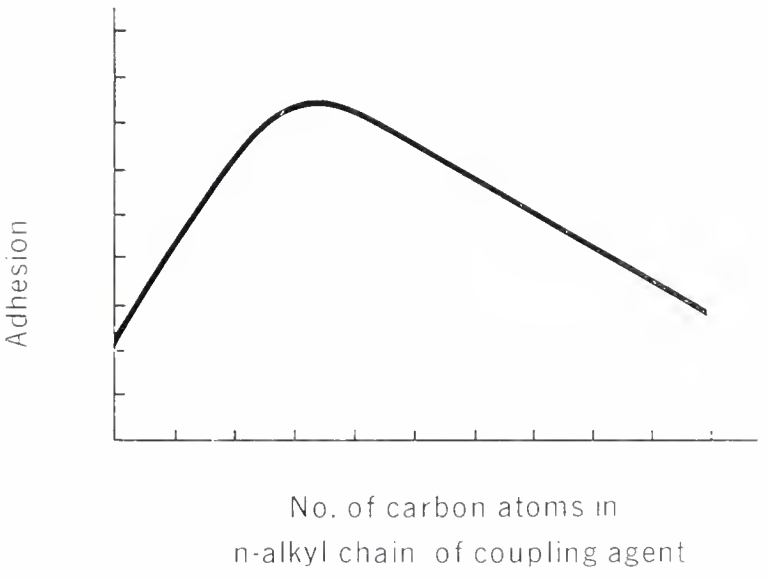


FIGURE 3: Variation of Adhesion with Number of Carbon Atoms in Alkyl Ester Chain of Coupling Agent.

Another important consideration is the effect of tissue adhesives on wound healing and the histotoxic effects of the applied adhesive materials. Houstan et al[18] evaluated the bond strength and histological characteristics of healing wounds in the subcutaneous tissue of rats as a function of time. The strength of wounds closed with adhesive was initially greater than the sutured wounds, but the situation was reversed about ten days later. The progressive reduction in wound strength, together with the increased histotoxicity, has been partly attributed to the inflammatory response developed at the incision site. The results also suggest that spreading of the tissue adhesive is important in wound healing. The more easily spreading materials showed a greater wound strength. Studies *in vivo* using *n*-alkyl-2-cyanoacrylates have shown that the higher homologues have decreased toxicity and rate of degradation in comparison to the lower ones. One of the degradation products is formaldehyde, which is known to be a protein precipitant and appears to be toxic toward certain types of tissues, particularly elastic fibre and cartilage cells. The degree of irritation also appears to be related to the vascularity of the tissue.[13] It is of interest to note that methyl-2-cyanoacrylate has been used as a hemostatic agent on the human aorta with no observable necrosis.[19]

An important fact in determining the degree of tissue response in the surgical application of tissue adhesives, is the amount or dosage of the applied adhesive agent. The various cytotoxic reactions common in these systems could be possibly eliminated if the effective dosage for adhesion to the tissue was known. However, conventional pharmacology does not permit an accurate estimate. A recent study has shown that the amount of adhesive agent commonly used in surgical applications

is many times in excess of the amount required to achieve maximum wound strength.[10, 20] If relatively mild tissue reaction is desired, a special procedure or instrument must be developed to ensure that no more than the optimum amount of adhesive agent is applied.

TABLE 2

Adhesion of Commercial Adhesives on Biological Tissue Coupled with Benzoyl Chloride

Manufacturer	*Trade Name*	*Adhesion**
Canadian Tire	Mermaid Polyester Resin	197
Goodyear	Pliobond	233
Dow Corning	Silastic Brand Medical Adhesive	
	Silicone Type A	82
	Silicone Type B	131
Le Page	Vinyl Plastic Repair	150
	Plastik Cement	113
L. D. Caulk	Grip Cement	150

* The strength of a similar wound healed naturally after nine days is 100.

In summary, present evidences have shown that adhesives can be used effectivcly to close incisions and wounds under various conditions. The surface of most biological tissues can be modified to induce adhesion to practically any synthetic polymer adhesive[10] (Table 2). The toxic effects of surgical adhesives appear to be dose-related, so that many of the current toxic effects can be eliminated or reduced by decreasing the amount of adhesive agent used. This could be achieved without any reduction in bond strength, since it has been shown that adhesion increases with the amount of adhesive agent up to a critical point. Beyond this point there is no advantage in increasing the amount of adhesive agent[10] (Figure 4).

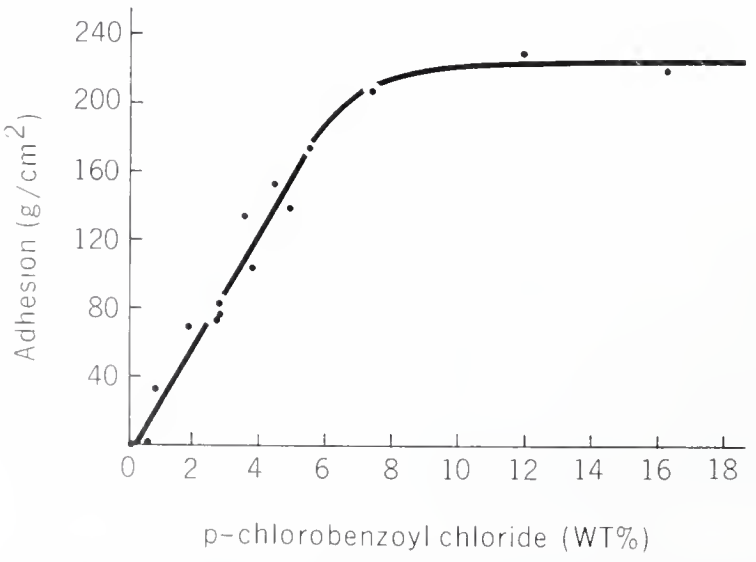


FIGURE 4: Changes in Adhesion of Pliobond Adhesive to Liver Tissue with the amount of p-Chlorobenzoyl Chloride (Coupling Agent) added (20).

Further studies on the fundamental aspects of adhesion to living biological tissue are likely to provide infomation important for the safe and effective use of adhesive agents in routine clinical surgery.

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Book Review

LIVES OF A CELL

Lewis Thomas, Bantam Books
180 pages - Cost: $1.75, first edition

Lewis Thomas, president of the Sloan-Kettering Center in New York, occasionally writes a column for the *New England Journal of Medicine*, called *Notes of a Biology Watcher*. Some of his columns have been collected and published under the title *Lives of a Cell*. The book is available as a hardback (Viking), or as a paperback (Bantam).

Due perhaps to the limits of space imposed upon him by the *NEJM*, the essays are all roughly the same length, and they are also similar in their structure. Thomas begins each essay with a fact or observation with which he "free-associates". The result is an erudite stream of consciousness that is delightful to read.

Some of his associations appear more than once in the book but the reader cannot object to the repetition of Thomas' fascinating ideas.

Language inspires his most unusual thoughts. Thomas compares its creation to the building of an ant colony. He describes the individual ant as:

> ". . . performing his work with infallible, undistracted skill in the midst of a confusion of others, all tumbling over each other to get the twigs and bits of earth aligned in precisely the right configurations for the warmth and ventilation of the eggs and larvae, but totally incapacitated by isolation . . . there is only one human activity that is like this, and it is language.
>
> . . . We have been working at it for what seems eternity, generation after articulate generation, and still we have no notion of how it is done, nor what it will be like when finished, if it is ever to be finished. It is the most compulsively collective, genetically programmed, species-specific, and autonomic of all the things we do, and we are infallible at it."

He writes about the problem of the growth of language in another essay:

> "Language grows and evolves, leaving fossils behind. The individual words are like different species of animals. Mutations occurs . . . Words fuse, and then mate. Hybrid words and wild varieties of compound words are the progeny. Some mixed words are dominated by one parent while the other is recessive. The way a word is used this year is its phenotype, but it has a deeply seated, immutable meaning, often hidden, which is the genotype . . . "

There follows a scholarly history of some words – from Indo-European, Sanskrit, or Latin to modern English.

In other essays Thomas argues (persuasively) for "high technology" of medicine – that is, for supporting basic research, so that the expensive, half-way technology such as organ transplants and artificial kidneys will no longer be needed. He discusses the difficulty of planning research, and the need to inculcate a "disquieting sense of being wrong (as) the normal attitude of investigators".

His reflections on pheromones, death, germs, and the Iks "unattached, brutish creatures, totally selfish and loveless (who) talk, but only to make ill-tempered demands and cold refusals" – brim over with calmness and wit. Thomas has held positions at the University of Minnesota, New York University – Bellevue Medical Centre, and Yale Medical School, as well as his current position at the Sloan-Kettering. He proves that there *is* opportunity for quiet ponderings in these places – which must be among the most frantic (and Ik-like) institutions in North America. This must provide encouragement for those of us who worry about losing our own calmness and sanity, even in such relatively low-keyed atmospheres as the one at the U of T medical school.

Frances Frankenburg

NOTICE

The Division of Orthopaedic Surgery of the University of Toronto awards a prize of $100 annually to the undergraduate student who writes the best article on orthopaedic training published in the U of T Medical Journal. We invite all students with an interest in this area of clinical training to submit their contributions to the Editor. Guidelines for publication appear in this issue of the Journal.

The editors and staff of the University of Toronto Medical Journal are pleased to announce that Rod Underell, 7T6 has been chosen the recipient of the 1975 Webster Prize for his article "Lasers in Ophthalmology", which appeared in the December 1974 issue of the Journal. The Webster Prize is awarded annually for the best article written by an undergraduate student during the year.

We would like to take this opportunity to thank the Academy of Medicine for their continuing interest and support.

(Continued from page 33)

to offer the broadest possible range of primary health care to our community, and will maintain its unique teaching program. We believe that centres really can meet a community's basic health care needs, and change the professional careers and aspirations of the hundreds of students who work in our clinics during their years of training. When centres integrating as many different health disciplines as ours does become commonplace, the day of "one-stop shopping" will dawn for the "Consumer" of health care.

Photos by A. Marcuzzi, Meds 7T7

(continued from page 37)

ACKNOWLEDGEMENTS

The authors would like to thank Dr. N. J. Howard, Endocrinology Department, Dr. M. Ipp, Immunology Department, Hospital for Sick Children and Dr. Guy Emery, Clinical Investigation Unit, Toronto General Hospital, for their time, helpful suggestions, and generous assistance.

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(continued from page 38)

SUMMARY:

The above outlines a goal-oriented process for the self-development of a positive approach to behaviour modification. It utilizes the "learning" potential of the individual in a growth-permitting atmosphere, encouraged by the use of appropriate medication and the informed expectations of the physician.

As Jim's daughter, Frances, says, "Gee, Dad, it's nice being able to talk things over in the family now".

---

* Diazepam 2 mg, Chlordiazepoxide 5 mg, and/or Amitriptyline 10 mg 4 or 5 times per day for adults; Hydroxyzine (Atarax) 10 mg 3 times a day, and/or Methylphenidate (Ritalin) 10 mgm ¼ tablet once or twice daily for children.

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1) All articles intended for publication should be submitted to the editor before the deadline which is usually **one** month before the release of the Journal, i.e. for the November 15 issue, the deadline is October 15.
2) Submitted articles should be typed (or legibly written) double-spaced, single sided on paper 8½" x 11" (letter size) and they shou'd not be more than 15 to 20 pages (3,000 to 4,000 words).
3) Illustrations, graphs, diagrams, figures and photographs should be put on a separate sheet and identified by Arabic numerals. A list of explanatory legends for all the figures and diagrams should be put on another sheet. Do not write on the back of photographs.
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5) The editor and associate editors reserve the right to make such editorial changes as are considered necessary to ensure correctness of grammar and spelling, clarification of statements and conformity to Journal style.
6) Acceptance for publication is subject to the understanding that such material is submitted solely to the Journal, and will not be reprinted without the consent of both the editor and author.

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Medical Student Transportation Fund (This Fund is primarily intended for medical student electives, although applications for travel connected with a work experience are also accepted. The maximum individual grant is $150. Applications for 1976-77 electives are accepted up to April 16, 1976 for the period June 1, 1976 to November 21, 1976, and up to October 1, 1976 for the period November 22, 1976 to May 8, 1977. The $3,600 is budgeted for the June to November period.)	3,600.00
Fund for Educational Activities	1,000.00
Not yet assigned	4,050.00

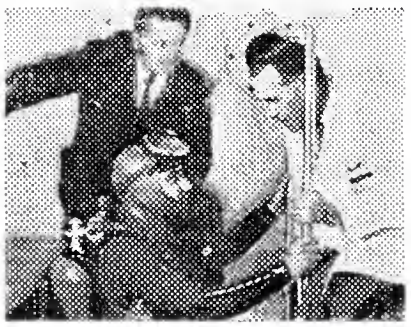
There are three additional Alumni Association scholarship awards. The **Samuel J. Streight, O.B.E., M.D., Scholarship in Internal Medicine** (value $300) is awarded annually to a student in the final year who has high standing in Internal Medicine. The **Dr. R. E. Haist Award in Physiology** (value $100) is awarded annually to a second year student who has achieved high standing in Physiology. The **Dr. K. J. R. Wightman Award in Internal Medicine** (value $100) is awarded annually to a final year student who has achieved high standing in Internal Medicine.

The Association administers two special funds. The **Dr. Bernard A. Manace Award** (value $110) provides assistance to a Medical student from any year who is undertaking an elective or summer Medical experience in Israel. Consideration is given to academic standing. The **Dr. L. Nelles Silverthorne Award** (value $194) provides assistance to a Medical student from any year who is undertaking an elective or summer Medical experience in a remote area. Preference is given to a student working in a mission hospital. Consideration is given to financial need. The deadline for applications for these two awards is March 1, 1976 for the subsequent 12 month period.

The Association has four loan funds. The **Medical Alumni Association Undergraduate Loan Fund** provides short term interest free loans to Medical students who require financial assistance during periods of temporary difficulty. The **Robert Elgin Towle Loan Fund** provides interest free loan assistance to women undergraduates. The **Medical Alumni Association Graduate Loan Fund (including the Emma Bissell and Agnes E. Hamshaw Funds)** provides interest free loans of up to $1,500 per year to physicians taking postgraduate training. The **Alexander and Martha Dalrymple Loan Fund in Psychiatry** provides interest free loans for physicians taking postgraduate training in Psychiatry. This fund is administered jointly by the Association and the University Department of Psychiatry.

Further information about any of the above, and application forms where required, can be obtained from Mrs. N. S. Shenstone, Secretary, Medical Alumni Association.

Your years at Medical School are the hardest. So how about some help along the way?



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